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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/708,943	04/02/2004	Long-Hui Lin	LKSP0028USA	2942
27765	7590	07/01/2005	EXAMINER	
NORTH AMERICA INTERNATIONAL PATENT OFFICE (NAIPC)			GUTIERREZ, ANTHONY	
P.O. BOX 506			ART UNIT	PAPER NUMBER
MERRIFIELD, VA 22116			2857	

DATE MAILED: 07/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/708,943

Applicant(s)

LIN, LONG-HUI

Examiner

Anthony Gutierrez

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, and 6-9 are rejected under 35 U.S.C. 102(e) as being anticipated by Nozoe et al. (United States Patent: US 6,777,677 B2).

As to claims 1, 2, 6, 7, and 9, Nozoe et al. discloses a method of defect root cause analysis (col. 4, lines 12-34) comprising following steps: providing a sample with a plurality of defects (col. 4, lines 35-47); performing a voltage contrast to identify locations of the defects (col. 4, lines 59-62); cutting the sample with a focus ion beam (FIB) to expose a cross-section of the sample (col. 9, line 67-col. 10, line 2); utilizing auger electrons to perform a chemical state analysis of the cross-section of the sample (col. 10, lines 3 and 4); performing a mapping analysis according to a result of the chemical state analysis and judging a root cause of the defect generation according to a result of the mapping analysis (col. 10, lines 5-33, and col. 12, lines 31-51).

As to claim 8, Nozoe et al. discloses that the method utilizes an auger electron spectroscopy (AES) to perform a chemical state analysis of the cross-section of the sample (col. 10, line 4).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozoe et al. (United States Patent: US 6,777,677 B2), in view of Moore et al. (United States Patent: US 6,777,674 B2).

Nozoe et al. discloses the use of auger analysis for detecting defects in a semiconductor wafer as address above.

Nozoe et al. does not specifically disclose that the auger analysis is performed in when the defects are not single phase particles.

Moore et al. however discloses that Auger analysis can be employed to provide phase information on chemical bonding of elements. This implies that the particles are not single-phase particles, since the analysis is needed to determine the phase information. Moore et al. further teaches that this analysis is advantageous for small diameter particles with respect to surface sample analysis (col. 2, lines 46-59).

It therefore would have been obvious to one of ordinary skill in the art at the time of invention to use Auger analysis, as disclosed by Nozoe et al., for non-single phase defects, as taught by Moore et al., to advantageously determine chemical bonding

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information related to small particle defects on the surface of the wafer, in order to more accurately determine the effect that a small particle has on the relationship of the bonding of wafer surface elements, thereby facilitating removal of the particle without damaging the wafer.

Nozoe et al. does not specifically disclose that an energy dispersive spectrometer (EDS) is utilized when the defects are thick particles.

Moore et al. however discloses an interchangeability between Auger and EDS techniques (col. 3, lines 23-43), and further teaches that EDS is beneficial for application with respect to relatively heavier particles than those for which Auger analysis would be beneficially (col. 2, lines 65-67).

It therefore would have been obvious to one of ordinary skill in the art at the time of invention to employ EDS techniques in place of Auger techniques, for thick particles, in order to facilitate the removal of a heavier particle, without risking background contamination that are common in Auger techniques, as taught by Moore et al. (col. 3, lines 1-16).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

United States Patent Application Publication

US 2005/0012521 A1 to Kolachina et al., teaches a method of FIB endpoint detection using charge pulse detection electronics.

United States Patents

US 6,855,568 B2 to Weiner et al., teaches a method for monitoring self-aligned contact arrays using voltage contrast.

US 6,777,676 B2 to Wang et al., teaches a method for non-destructive root cause analysis.

US 6,664,797 B1 to Wollesen, teaches a method for profiling semiconductor device junctions using voltage contrast SEM.

US 6,519,542 B1 to Giannuzzi et al., teaches a method for testing an unknown sample using a detection limit.

US 6,238,940 B1 to Steffan et al., teaches a method for analyzing defects with a discussion of FIB, Auger, and EDS techniques.

6,084,679 to Steffan et al., teaches a method for semiconductor defect capture and analysis using universal alignment marks.

5,383,018 to Sadjadi, teaches a method for calibration of patterned wafer scanners.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Gutierrez whose telephone number is (571) 272-2215. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc Hoff can be reached on (571) 272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AG
Anthony Gutierrez

6/24/05

